GA1.13:RCED-86-134

United States General Accounting Office

GAO

Report to the Honorable Byron L. Dorgan
House of Representatives

DEC 0 ? 1987

COMPLETED 52

May 1986

U.S. GRAIN EXPORTS

Concerns About Quality

OFFICIAL

GAO/RCED-86-134

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-223024

May 19, 1986

The Honorable Byron L. Dorgan
House of Representatives

Dear Mr. Dorgan:

Your January 18, 1985, letter requested that we investigate the alleged practice of adding dust and other material to U.S. grain before shipment overseas. You stated that you had been receiving an increasing number of complaints from wheat producers who see grain leaving their farms in good condition, but who then suspect that export elevators add dust and other material to the grain to boost the elevators' profits. Some believe that this is a reason why an increasing number of foreign purchasers of U.S. grain have been expressing dissatisfaction with the quality of the grain they have received. You added that there is a fear that, if something is not done, these purchasers will turn to other countries to satisfy their grain needs, if they have not already done so. Canada—a chief competitor of the United States in world wheat markets—is said to routinely clean its wheat before shipment. Australia is said to have stricter and simpler grain standards than the United States.

In response to your letter and several meetings with you, we agreed to obtain information on (1) the U.S. Department of Agriculture's (USDA's) system for receiving and reporting on grain quality complaints, (2) a number of surveys that USDA's Federal Grain Inspection Service (FGIS) has conducted related to the practice by some elevators of extracting dust from grain for safety reasons, but then adding it back to the grain before shipment overseas, (3) the amount of dockage—waste material that can be easily removed—in wheat shipments throughout the marketing stream, and the extent to which various market participants were benefiting from the current rule of rounding dockage measurements down to the nearest one-half percent, and (4) FGIS' disposition of recommendations we previously made relating to grain quality.

We found that

- The number of complaints received by USDA from foreign buyers of U.S. grain increased in fiscal year 1985 as compared to the past several years. USDA's complaint system may not reflect the total situation, however. Foreign purchasers are not always inclined to use the system because USDA can do little to help them resolve their disputes with U.S. exporters. (See app. I.)

- Since 1981 FGIS has conducted three surveys to determine the number of export elevators that extract airborne dust from grain as it is leaving the elevator, but then add this dust back to the grain as it is being loaded onto the ship. In 1981, 25 of 75 elevators surveyed were adding back such dust either totally or partially, compared to 30 of 77 elevators surveyed in 1983, and 32 of 79 elevators surveyed in 1985. FGIS officials told us that the amount of dust involved at this point in an elevator's operations is insignificant and that it is unlikely that the amount of dust added by this practice is a primary reason why foreign purchasers have complained about U.S. grain quality. (See app. II.)
- In terms of dockage, our analysis generally did not support the wheat producers' contention that dust and other material is added to wheat as it moves from their farms through interior points in the marketing stream towards export. Although statistically valid comparisons cannot be made, our analysis showed that dockage measurements in wheat shipments at harvest and interior marketing points fell within much broader ranges (0 to over 10 percent and 0 to 9.49 percent, respectively) than the dockage measurements taken at export points (0 to 2.99 percent). Our analysis can be interpreted in two ways: (1) some clean wheat at harvest is downgraded through the practice of blending it with dirtier wheat as it moves through the marketing stream or (2) a substantial amount of wheat with relatively high levels of dockage early in the stream is upgraded as a result of blending or cleaning by the time it reaches the export point.

  Our analysis also showed that 22 grain elevators, responsible for about 80 percent of the total wheat export shipments in 1984, were all benefiting from the current dockage rounding rule that allows up to 0.49 of a percentage point of dockage to go unreported. The current rounding rule benefits the wheat seller to the degree that he or she receives wheat prices for the amount of less valuable dockage in the wheat being sold, up to 0.49 of a percentage point. Just the opposite is true, though, for the buyer of that wheat who gets less wheat than what he or she paid for. Some buyers of U.S. wheat consider the above practice a form of deception. There are others who believe that the practice does not enhance U.S. wheat exports and that the current dockage rounding rule needs to be tightened. The extent to which each of the 22 export elevators was benefiting from the current dockage rounding rule varied. The highest amount of undisclosed dockage being shipped by an elevator was 0.43 of a percentage point, the lowest amount was 0.13 percent, and the average for the 22 elevators was about 0.26 percent. (See app. III.)

- A number of the recommendations we have made in past reports, concerned with the quality of U.S. grain shipped overseas, have been considered by FGIS but have not been implemented. One of them, in particular, dealt with revising applicable grain standards to require that dockage measurements be certified to the nearest one-tenth of a percent, rather than down to the next one-half percent as it is now. These recommendations, if implemented, would have resulted in inspection certificates that more accurately reflected the actual quality of the grain, provided end-users with better information on certain quality factors, and assured greater uniformity in grain quality within a shipment. In the past, FGIS has resisted making certain changes in the Official United States Standards for Grain because of a lack of a majority of industry support and its conviction that the standards are "standards of consensus." (See apps. III and IV.)

Our work involved obtaining documentation from and holding numerous discussions with officials of USDA and the U.S. grain industry about the quality of grain the United States has been exporting. We also attended several USDA/industry-sponsored conferences in which grain quality was the main topic of discussion. Much of our review time was spent analyzing overseas buyers' complaints about grain quality, FGIS' dust surveys, and wheat dockage measurements. More detailed information on the objectives, scope, and methodology of our work may be found in each of the appendixes to this report.

Officials from USDA were given an opportunity to comment on a draft of this report. In the comments received, USDA stated that the report was objective and also provided a number of minor, clarifying suggestions and technical corrections, which we made in the report.

As arranged with your office, unless you publicly announce its contents earlier, we do not plan to distribute this report further until 14 days from its issue date. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

Brian P. Crowley

Brian P. Crowley
Senior Associate Director

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Abbreviations

D	Durum wheat
FAS	Foreign Agricultural Service
FDA	Food and Drug Administration
FGIS	Federal Grain Inspection Service
GAO	General Accounting Office
HRS	Hard red spring wheat
HRW	Hard red winter wheat
OTA	Office of Technology Assessment
SRW	Soft red winter wheat
USDA	U.S. Department of Agriculture
W	White wheat

Foreign Complaints About the Quality of U.S. Grain Have Been Increasing

The number of foreign buyers complaining about the quality of U.S. grain seems to be on the rise. In the past year or so, numerous news accounts, anecdotal stories, and government and/or industry-sponsored conferences have been devoted to discussing the quality of U.S. grain that is being exported and about the ramifications of exporting poor quality grain. Even USDA's complaint system, which, according to USDA, does not capture all such incidences of dissatisfaction, has shown a fairly significant rise since 1982 in the number of complaints being reported through it. This was particularly true in fiscal year 1985 when the total number of complaints increased by three times over the previous year to 75, and the complaints involving wheat more than doubled. Excessive dockage in wheat is a problem that was complained about and one in which Congressman Dorgan was interested.[1]

One of our objectives was to examine USDA's system for receiving and reporting on grain quality complaints. We were particularly interested in the number and types of foreign complaints being received and the trend of those complaints over the past several years. We discussed foreign complaints about the quality of U.S. grain, in general, and about the quality of U.S. wheat, in particular, with officials from FGIS and USDA's Foreign Agricultural Service (FAS). We also discussed foreign complaints about grain quality with officials of two wheat promotion organizations who are frequently in touch with foreign buyers; however, we did not discuss the subject directly with foreign buyers. We obtained and analyzed a number of reports having to do with grain quality complaints. FGIS is required to prepare and submit these reports to Congress on a quarterly and annual basis. We summarized the complaints to put those that related to wheat and dockage in context with all the foreign complaints that were filed. We did not examine the system in-depth because we learned that USDA's Office of Inspector General was also doing work in the area.

Background

USDA's foreign complaint system is authorized under the United States Grain Standards Act (7 U.S.C. 71). Under FGIS regulations, inquiries or complaints from importers or other purchasers in foreign countries,[2] to

[1]Dockage is all material other than wheat that can be readily removed from a wheat sample because it is either larger or smaller than the wheat kernels. Such material generally consists of chaff, course grains, weed seeds, and dust. It also includes underdeveloped, shriveled, and small pieces of wheat kernels that, because they are so small, could not be recovered for use in flour milling even if the dockage material was rescreened. Wheat dockage is discussed in more detail in app. III.

[2]An importer may resell grain once it is received abroad. Both importers and any others who purchase grain from them may file complaints.

the extent possible, should be submitted to an appropriate FAS Agricultural Attache. FGIS' primary source of foreign complaints, then, is through FAS.

There are three types of complaints—formal, informal, and informational. A complaint is considered formal when a specific complaint form is completed by an importer or other foreign purchaser and submitted to FAS. It is considered informal when the importer or other foreign purchaser makes an inquiry, but no complaint form is completed. An informal complaint can subsequently be made formal within certain time constraints. Foreign complaints received directly by FGIS—complaints that did not go through FAS—are considered by FGIS for informational purposes only and are not routinely reported.

Frequency and Types of Complaints

Table I.1 shows the number of complaints received by FGIS through USDA's foreign complaint system from October 1979 through September 1985. The complaints are broken down by type of grain. For perspective, there were about 7,000 grain export shipments in fiscal year 1985 and about 8,000 shipments in fiscal year 1984. There are few complaints in comparison to the total number of shipments; however, we were told by USDA's FAS that the complaint system does not capture all incidences of foreign buyers' dissatisfaction.

Table I.1: Foreign Complaints Received by FGIS From October 1979 Through September 1985

	Number of formal and informal complaints						
Fiscal year	Wheat	Corn	Soybeans	Barley	Sorghum	Sunflower	Total
1985[a]	21	22	31	•	•	1	75
1984	8	8	7	1	•	•	24
1983	10	1	5	•	•	•	16
1982[b]	6	2	4	1	1	•	14
1981[a]	11	8	5	•	•	•	24
1980	16	26	2	•	3	•	47
Total	**72**	**67**	**54**	**2**	**4**	**1**	**200**

[a]FGIS counted as one a complaint regarding both wheat and corn. We counted the complaint once for corn and once for wheat.

[b]FGIS counted as one a complaint regarding both corn and sorghum. We counted the complaint once for corn and once for sorghum.

As can be seen, the numbers of complaints filed since 1982 have increased. This was particularly true in fiscal year 1985, when complaints were three times greater than they had been the year before, and

wheat complaints more than doubled. Regarding the recent increases that occurred with respect to wheat, the head of International Monitoring in FGIS—an office that investigates the validity of the complaints received—said foreign buyers of wheat were more quality-conscious because of higher prices.[3] Regarding soybeans, he said most of the complaints were due to the high moisture content in the 1984 crop as compared to the lower moisture content of previous crop years. Foreign buyers purchased U.S. soybeans, expecting to receive the 12.5 percent moisture content that was typical of previous years. Instead they received about 13.5 percent moisture. Although 13.5 was less than the 14 percent moisture then allowed for U.S. No. 2 soybeans, the 1 percent additional moisture resulted in a loss of 1 percent yield in processing. Regarding corn, he said, the increasing complaints were due to high moisture in the 1984 crop. Due to a drought that occurred in 1983, limited stocks of drier corn were available to sell. High and low moisture corn were therefore blended together, resulting in a situation that can adversely affect the storability of corn.

The Director of FAS' Grain and Feed Division made similar comments. In addition, he said that the demand for corn was extraordinary at the time of the 1984 harvest, that only limited stocks of older corn were available to be sold or blended with the high moisture crops just harvested, and that warm weather at the time the 1984 crop was being loaded for export encouraged biological developments in corn such as insects, fungus, and molds. The circumstances leading up to this situation were considered highly unusual, so much so that their combined effects caused problems for even the most experienced traders. The FAS official said that the conditions, all taken together, probably would not occur again within the next 25 years.

Regarding complaints generally, the FGIS Administrator said in a September 1985 speech at an American Farm Bureau Federation Grain Quality/Marketing Conference that one cannot ignore the fact that foreign complaints have risen. He said:

- Many problems are caused by importers using grain inspection and handling equipment or procedures that are different from ours.

[3]The number of complaints FGIS has considered to be valid has, typically, been quite small. In fiscal year 1985, for example, only 1 of the 75 complaints was considered valid. In fiscal years 1984, 1983, and 1982, the numbers of complaints deemed valid by FGIS were 3, 1, and 4, respectively. FGIS' Annual Report did not summarize the number of complaints deemed valid in fiscal years 1981 or 1980.

- Some problems can be traced to shipments shared by a number of buyers—divided-lot certificates where an importer gets only a part of the shipment. Although the whole shipment actually met contract requirements, certain parts may not be representative due to unloading and handling conditions (and, as others have told us, due to the physical properties of the grain itself and the natural separation of the grain kernels and other particles that occurs during handling).
- Some importers may have been expecting grain of the quality they have received in previous years. They may have received a bonus in those years when the crop was good and most shipments represented the upper limits of the contract grades. In a year when harvest conditions are not so good, the quality of many shipments falls toward the lower limits of the grades.
- Another reason for complaints may be political—importers looking to diversify their purchases from more sources use the quality argument to hide their real motives.

However, he said, adverse price competitiveness is the major cause of the decrease in exports.

Congressman Dorgan was particularly interested in complaints about wheat. Table I.1 shows the number of such complaints to have risen from 8 to 21 during the past 2 fiscal years and to have totaled 72 over the past 6 fiscal years. Tables I.2 and I.3 show more detailed information on the wheat complaints. Table I.2 categorizes the complaints as to whether they were formal or informal and as to quality or weight. Table I.3 summarizes the complaints according to the nature of the complaint.

Table I.2: Formal and Informal Foreign Complaints Regarding Wheat Filed Between October 1979 and September 1985

		Number of quality complaints		Number of weight complaints	
Fiscal year	Total	Formal	Informal	Formal	Informal
1985	**21**	8	12	1	•
1984	**8**	4	2	1	1
1983	**10**	6	2	2	•
1982	**6**	4	2	•	•
1981	**11**	4	4	•	3
1980	**16**	12	1	•	3
Total	**72**	**38**	**23**	**4**	**7**

Table I.2 shows that most of the wheat complaints that FGIS received concerned quality rather than weight. There were a total of 61 wheat

quality complaints and 11 weight complaints during the 6-year period. The predominant type of quality complaint was formal—the complainant having filled out and submitted the necessary form. Those questioning the accuracy of a wheat shipment's weight more frequently made inquiries that are categorized as informal complaints.

Table I.3: Foreign Complaints About Wheat Summarized by the Nature of the Complaint (October 1979 Through June 1985)[a]

	Total	1985[b]	1984	1983	1982	1981	1980
Low protein content	**14**	3	1	1	3	1	5
Shortweight	**11**	1	2	2	•	3	3
Infestation	**9**	4	•	3	•	•	2
Excessive dockage	**5**	2	•	1	1	•	1
Excessive heat damage	**3**	1	2	•	•	•	•
Low test weight	**2**	•	•	1	1	•	•
Low quality	**2**	1	•	•	•	1	•
Excessive foreign material	**2**	2	•	•	•	•	•
Excessive shrunken and broken kernels	**2**	•	2	•	•	•	•
Excessive contrasting classes	**2**	•	•	1	1	•	•
Excessive dockage, sprout, and defects	**1**	•	•	•	•	•	1
Excessive dockage, moisture, and low test weight	**1**	•	•	•	•	1	•
Excessive dockage, heat damage, and stones	**1**	•	•	•	•	1	•
Excessive dockage, shrunken and broken, damage, and defects	**1**	•	•	•	•	1	•
Excessive damage, foreign material, shrunken and broken kernels	**2**	1	•	1	•	•	•
Excessive contrasting classes and shrunken and broken kernels	**1**	•	•	•	•	1	•
Excessive damage	**1**	•	•	•	•	1	•
Excessive heat damage and dark kernels	**1**	•	•	•	•	•	1
Water damage, mold, and infestation	**1**	•	•	•	•	•	1
Excessive sprout damage	**1**	•	•	•	•	•	1
Sorghum mixed with wheat	**1**	•	•	•	•	1	•
Sunflowers mixed with wheat	**1**	•	•	•	•	•	1
Fecal contamination	**1**	•	1	•	•	•	•
Total	**66**	**15**	**8**	**10**	**6**	**11**	**16**

[a]This table covers a shorter time period than tables I.1 and I.2 because the fourth quarterly report was not available in March 1986 for inclusion in this table.

[b]First three quarters of fiscal year 1985.

Table I.3 shows that, over the 5-3/4 year period, the most frequent complaint concerned low protein content. It was followed by shortweight (the destination weight being less than the weight at origin), and insect

infestation. Foreign buyers complained specifically about excessive dockage material in wheat on nine occasions—five complaints were about excessive dockage by itself, and four were about excessive dockage combined with complaints about one or more other quality factors.

In two prior reports, we noted that foreign buyers, for the most part, were not using USDA's formal complaint system. In our report entitled Federal Export Grain Inspection and Weighing Programs: Improvements Can Make Them More Effective and Less Costly (CED-80-15, Nov. 30, 1979) and an earlier report entitled Assessment of the National Grain Inspection System (RED-76-71, Feb. 12, 1976), we reported that foreign buyers often did not report their complaints to USDA because USDA can do nothing to help them resolve disputes with U.S. exporters. Officials from FAS and U.S. Wheat Associates confirmed that this condition still exists.[4] For example, FAS officials told us that:

- The vast bulk of the foreign complaints or concerns about U.S. grain quality never go beyond the buyer and seller, and FAS is often unaware of problems.
- Foreign buyers appear to come to FAS only when the particular problem is (1) persistent, (2) of a new type, or (3) viewed as serious.
- The system is not designed for recourse. Because foreign buyers know they will get no redress from the system, there is not much incentive for them to use the system to complain.
- Although the complaint system does not offer redress, grain contracts do provide for settlements of disputes between sellers and buyers.

Foreign complaints that are received through the system are reviewed and even scrutinized by USDA and the U.S. grain trade. Along these lines, the FGIS Administrator stated in March 26, 1985, testimony before the Subcommittee on Agriculture, Rural Development and Related Agencies, House Committee on Appropriations, that:

"One of the frequent complaints is about appearance. Someone will open up a ship hold and say, that there is a lot of 'fine' material on the top, and it looks like the shippers have added dust. Whereas in reality, when the ship was loaded, the light, low density material boiled up and remained on the top of the grain. If you probe below the surface, you will find that there is sound grain. Very often you will find that in foreign countries, an 18-inch or a 1-meter probe is used. If you can obtain a 3-meter probe to get down into the bulk of the grain, you will find an entirely different appearance in quality. The method of sampling is very important."

[4]U.S. Wheat Associates is a producer-directed, export market development organization.

FGIS' Annual Report to Congress, 1985 stated that segregation (separation of lighter materials from whole kernels and the congregation of those light materials on the top surface of the grain), sampling techniques, and grading methods at destination can account for over 90 percent of the foreign complaints. It also stated that:

"Generally, foreign buyers recognize the levels of grain quality that the official U.S. grades represent. In some cases, however, buyers have a preconceived concept of what the grain quality should be. When it does not meet these expectations, they may complain—even if the quality is within the grade limits. U.S. standards have tolerances for various grading factors which are greater than our chief competitors. The standards are published and buyers of U.S. grain have ready access to them."

The validity of complaints is questioned sometimes because they are based on the foreign nation's or purchaser's own standards or methods for measuring grain quality. One exporter wrote the following to us concerning this problem:

"The quality of U.S. wheats must be judged by their compliance to contract and the U.S. Grain Standards which, because of their universal familiarity and use, are de facto international standards. When so judged, both buyer and seller agree on the excellent quality of U.S. wheats which make the U.S. the leading exporter of wheat. Certainly there is no place in international trade for comparisons made with parochial testing methods known only to those who use them for in-house studies."

In appendix III we mention that the United States and Europe use different methods of measuring dockage and that these differences have caused confusion.

Some officials we talked with discounted the importance of some complaints because they believed they were made for price rather than quality reasons. The FGIS International Monitoring Staff Director told us, for example, that the incidence of foreign complaints increases when holders of grain contracts at a given price see the future price of U.S. grain dropping; when the price of grain is right, there are no complaints. An official of a wheat promotion organization told us that when there is an oversupply situation, complaints become a bargaining point. Another official of the same organization said that complaints might be made in order to lower the sales price; however, he believed there were some legitimate quality complaints separate from the price issue.

Recognition of quality-related problems is more open than it used to be. Just a short time ago there seemed to be some reluctance on the part of the U.S. grain industry and the government to openly acknowledge that there may be a problem with the quality of grain being exported from

the United States. During the past year, however, this mood seems to have changed. A number of government and/or industry-sponsored conferences and workshops have been or are being held to discuss grain quality problems—whether they be real or perceived—and what can be done to alleviate them. Members of the grain trade now seem more willing to talk about industry-initiated change, even though many of them believe that price-related issues are the primary reason for our decline in exports and for foreign buyers' complaints. For example, an official of a grain company that exports wheat wrote the following, as part of a letter to its suppliers asking for their opinion on a proposed change in the dockage rounding rule:

"Macroeconomic factors like the high value of the dollar, the lack of credit available to lesser developed countries, cargo preference, and huge supplies of grain around the world are far more important than any quality problems in reducing our exports. We live in a 'buyers' market. Inevitably, buyers find reasons to complain about the quality of the goods they receive when there are a lot of willing sellers standing around trying to serve them. In other words, quality can be an excuse for lower exports rather than a fundamental reason for them. Nonetheless, we should look for ways to improve our system in the eyes of international buyers. It would be foolish for us to be defensive. It would be equally foolish to fix something if it does not need fixing. It is up to all of us to determine what course to take."

An official of U.S. Wheat Associates told us that market conditions are highly competitive and that for the United States to have any chance for success in marketing wheat, it must address the quality concerns of its foreign customers without prejudging the validity of those concerns.

We do not know what portion of the increase in foreign complaints over the past several years is a result of actual poor quality grain or a result of perceived poor quality—perceived poor because of such things as higher prices, inaccurate sampling methods, or different grain standards and measurement procedures. Regardless of whether the grain actually is of poor quality or perceived to be of poor quality, the increase in complaints in recent years is an indication that an increasing number of foreign customers have been less than satisfied with the quality of U.S. grain that is being shipped to them.

FGIS Surveys of Export Elevators That Extract and Reintroduce Grain Dust

Congressman Dorgan's January 1985 letter stated that a 1982 FGIS survey had indicated that a third of all export elevators add dust or other material to grain before shipment overseas. He expressed concern that the survey provided no information on the amount of export business being conducted by this group of elevators, and that, if these elevators do a disproportionately large share of the business, then a greater portion than one third of the grain the United States exports has dust or other material added to it at the export elevator. At his request, we looked into the so-called dust surveys that FGIS has been conducting by talking with FGIS officials and by obtaining and analyzing the survey results.

We learned that a number of surveys have been performed dating back to 1981; we were told by FGIS officials that the impetus behind the surveys, at least initially, was legislation introduced by Congressman Neal Smith that, if passed, would have prohibited dust and other material from being added to grain at export elevators. We were told also that the surveys were concerned only with the practice of extracting and adding back airborne dust after the grain is either officially weighed or inspected, whichever occurs first, just before it is loaded onto the ship. The scope of the surveys did not cover the disposal of dust collected earlier in the elevator, nor did it include any kind of examination of the blending of different quality grains that might go on in an individual elevator. An FGIS official explained that the agency has no jurisdiction over what goes on in the elevator up until the point where grain is weighed or inspected for export shipment.

Three FGIS dust surveys have been conducted since 1981. The first survey was conducted in 1981 but reported in 1982. It was followed by a similar survey in 1983 and one done in 1984 but reported in 1985.[1] Results from each of the three surveys are shown in the following table.

[1] As we were developing this report, we learned of an additional dust survey that had been conducted in the latter part of 1985. Although we did not obtain details relative to this survey, we were told by an FGIS official that its results generally followed the same pattern as the three surveys preceding it.

Table II.1: Export Elevator Practices of Disposing of Dust Extracted During Outloading

	FGIS dust surveys		
	1982[a]	1983	1985[b]
Number of elevators			
U.S. elevators	68	71	73
Canadian elevators[c]	7	6	6
Total	**75**	**77**	**79**
Percent reintroducing all dust[d]	26.6	22.1	22.8
Percent reintroducing at least a portion of the dust	6.7	16.9	17.7
Percent removing dust and not returning any of it to the grain flow	66.7	59.7	58.2
Percent without a dust removal system[e]	0.0	1.3	1.3
Total	**100.0**	**100.0**	**100.0**

[a]This survey was conducted in 1981 but reported in 1982.

[b]This survey was conducted in 1984 but reported in 1985.

[c]The Canadian elevators are transfer points for U.S. grain that is inspected, weighed, and loaded into lake vessels at Great Lakes ports. The U.S. grain is unloaded and stored in these Canadian transfer elevators before being reloaded aboard ocean-going vessels for export.

[d]All of the Canadian elevators included in the surveys are included in this category.

[e]FGIS reported in 1983 and 1985 that one U.S. elevator had no dust removal system. That same elevator was reported, in 1982, as having a system and not reintroducing dust.

Table II.1 shows that, in 1981, about 33 percent of the export elevators were reintroducing all or part of the dust they had extracted after weighing or sampling—whichever occurred first—to the grain as it was loaded in the ship. In 1983 and 1985 the percentages were 39 and 40.5, respectively. Although the number of elevators reintroducing dust, either totally or in part, has risen from 25 of 75 total elevators in 1981 to 32 of 79 elevators in 1985, we were told by FGIS officials that the amount of dust reintroduced to the grain is insignificant and that it is unlikely that such a practice is a primary reason foreign purchasers of U.S. grain would complain about the quality of the grain they received. Along this line, the FGIS Administrator testified on March 26, 1985, before the Subcommittee on Agriculture, Rural Development and Related Agencies, House Committee on Appropriations, that:

"As grain is handled in an export elevator, dust and/or foreign material may or may not be removed and added back to the grain. Only airborne dust that has been captured by the elevator's dust collection system after the grain is sampled and weighed for export, can be returned to the grain on the way to the vessel. Therefore, the dust in question would represent only a very small percent by weight."

Pursuant to Congressman Dorgan's request, we took our analysis a step further to determine the level of export activity of the elevators that were reintroducing dust to export shipments. We identified 22 elevators that were responsible for the greatest number of export wheat shipments during 1984 and found that 8 of them were elevators that reintroduced all or part of the dust they had collected, after weighing and sampling, to the wheat that was being loaded on ships for export. The eight elevators were responsible for about 28 percent of the total export wheat shipments in 1984. This information is reflected in some detail in table III.8. Among other things, the table shows little correlation between the elevators that were reintroducing dust to export grain shipments and the elevators in the table with the greatest dockage amounts in their 1984 wheat export shipments. Although not shown in the table, the eight elevators were responsible for about 38 percent of the total volume of wheat exported from the United States in 1984.

During 1985, three bills designed to improve the quality of U.S. grain that is exported were introduced in the Congress (H.R. 455 introduced by Congressman Neal Smith; H.R. 1206 introduced by Congressman Byron Dorgan; and S. 1121 introduced by Senator Mark Andrews). These bills, prohibiting and/or limiting exporters from adding dust and other material to grain shipments, have sparked considerable discussion within the FGIS Advisory Committee, a committee made up generally of a variety of individuals from the grain industry whose purpose is to advise the FGIS Administrator on matters related to grain marketing. A subcommittee of this committee was established to review the ramifications of the proposed legislation. The subcommittee found that the grain industry fully supported the prohibition against the addition of non-grain-related material to grain shipments. The subcommittee regarded such a practice as morally, ethically, and legally objectionable, and potentially devastating to maintaining and expanding U.S. grain markets. The subcommittee recognized that although some of this activity may have taken place during the "scandal-riddled" mid-1970's, the penalties imposed and corrective actions subsequently taken have minimized the chance of it happening now or in the future.

The subcommittee found, however, that segments of the grain industry, especially the exporters, strongly objected to any possible prohibition on the return of grain-related material (such as dust) back to the grain stream after it has been removed. The rationale behind the objection is that there is nothing unethical, immoral, or illegal about this practice; that the customer is getting exactly and uniformly what he or she is

paying for; and that, if the customer wants better quality, he or she can specify it and, of course, pay for it.

Of several alternatives the subcommittee looked at in terms of disposing of dust that is collected, putting the dust back into the grain stream was considered the least costly in terms of capital costs and also the most cost-effective, providing that the elevator stays within the contract limits for such things as dockage. The subcommittee believed that the amount of dust, because it is but a fraction of a percent, would rarely affect quality-related factors such as dockage. Three other means by which dust has been or is currently being disposed of and which the subcommittee considered involved:

- Blowing the dust out into the air as many elevators once did—a practice the Environmental Protection Agency has since prohibited in nearly all areas.
- Putting the dust in a special bin with a separate handling and "out-loading" system. From this bin, dust is sold, given away, or disposed of. This method requires initial capital costs that can run up to $250,000 per elevator and can be particularly risky because handling pure dust is more hazardous than handling dust mixed with grain.
- Putting the dust in a special bin with a separate handling system plus the equipment needed to transform the dust into pellets. Although this practice adds another capital cost, pelleted dust does have a broader market and is easier to transport.

Wheat Dockage[1]

During several meetings Congressman Dorgan expressed interest in wheat dockage and the way in which it is determined and reported on the official grade certificate. In response, we agreed to obtain and analyze available information from USDA concerning wheat dockage. We agreed to report on the amount of dockage at various points in the marketing stream and the extent to which market participants were benefiting from the current dockage rounding rule that some believe is too liberal and in need of tightening.

Background

National grading standards for grain were first authorized under the United States Grain Standards Act of 1916. National standards were needed because (1) some domestic grain markets (such as in Chicago and St. Louis) were developing their own standards and (2) differences in the standards of each market were beginning to impede the trading of grain between the markets. The national standards became the basis for describing the quality of grain being sold domestically and to foreign countries—enabling traders to buy and sell grain without having to personally observe its quality. As amended, the Grain Standards Act authorizes USDA to establish standards for corn, wheat, rye, oats, barley, flaxseed, sorghum, soybeans, mixed grain, and other grains as the Administrator deems necessary. Since 1976, FGIS has been the agency within USDA responsible for administering the standards.

In the United States, five different types or classes of wheat are grown. These classes are hard red spring, durum, hard red winter, soft red winter, and white. Hard red spring and durum wheats are planted in the spring and are referred to as spring wheats. Hard and soft red winter wheats are planted in the fall and are referred to as winter wheats. Each class of wheat is differentiated by its physical appearance and its milling and baking characteristics. Different classes of wheat have different end uses; some are used for bread and others for bakery products other than bread or for pasta products. The price per bushel differs for each class of wheat.

According to the Official United States Standards for Wheat, there are six different grade categories: U.S. Nos. 1, 2, 3, 4, 5, and Sample grade. In determining the grade of a particular lot of wheat, inspectors—either FGIS employees or licensed employees of state or private organizations—consider the following factors: test weight, heat damage, total damaged

[1]See definition in ftn. 1, app. I.

kernels, foreign material, shrunken and broken kernels, total defects, and the presence of other classes of wheat.

Inspectors also make note of other quality factors that do not affect the grade designation but do affect the wheat's value. In this regard, the official grade certificate must not only include the class and grade designations, but must also indicate (1) whether or not a special grade designation applies because the wheat contains such undesirable factors as fungus, disease, and insect infestation and (2) the amount of dockage the wheat contains.

Dockage content does not affect the numeric grade assigned to a wheat lot. Normal trade practices provide for an adjustment in the weight of a wheat shipment based on the certificated dockage content. However, as will be discussed, wheat that is said to be "dockage free" may, in fact, contain as much as 0.49 of a percentage point of undisclosed dockage under current certification procedures.

Dockage material comes from several sources. Some dockage material, such as weed seeds, chaff, and underdeveloped and shriveled kernels, comes directly from the wheat fields. Although wheat producers can adjust the equipment they use in harvesting wheat (combines) so that some of this material is returned to the field, some do not do so because it would result in some wheat kernels being returned to the field as well. Other producers do not make the adjustments because there is little incentive for them to do so. Some country elevators,[2] for example, do not impose a price penalty for wheat delivered with high dockage. These elevators have a number of ways in which they can settle purchases of wheat from producers without measuring the amount of dockage in each load of wheat delivered to them. For example, one elevator's policy may be to deduct, because of dockage, a flat 0.5 percent from the weight of each wheat shipment purchased. A second elevator may settle its wheat purchases on the basis of a composite sample of all the wheat one producer delivers on a given day. A third elevator may choose not to deduct any weight for dockage or even discuss dockage with producers, but rather offer the producer a lower price—a price that reflects the deduction that the elevator will receive when it in turn resells the wheat.

[2]A country elevator is the first link in the chain of moving grain from the farm to the ultimate user. Farmers generally deliver their grain by truck to country elevators where it is stored for subsequent sale or use.

Some country elevators do not have the equipment needed to determine the amount of dockage material in wheat. If dockage is not measured or if composite samples are used in settling wheat purchases at country elevators, the producers of that wheat may not know whether the wheat they delivered to the elevator was clean or dirty. If no deduction is made for dockage—either a deduction from the settlement weight and/or a reduced price that is attributed to the amount of dockage in the wheat—it is possible that some producers who deliver relatively dirty wheat may not realize that it was dirty or may even believe that their wheat was clean.

The amount of dockage in wheat varies depending on the peculiarities of the various growing areas and according to the peculiarities of the individual wheat classes. For example, spring wheats and some winter wheats that are grown in traditional spring wheat areas generally contain more dockage because certain weed seeds are inadvertently harvested along with the wheat. The kernels of some wheat classes are harder and more brittle than the kernels of other classes. Such kernels tend to chip and break easily during handling, and the resulting kernel pieces are considered dockage. Dockage may also be added to wheat intentionally or unintentionally as it moves through the marketing stream. This might be the result of an elevator blending a particular quantity or "lot" of wheat that is relatively clean with a lot that is not so clean. On the other hand, dockage in wheat sometimes results from the failure to properly clean storage, handling, or transport equipment that has also been used for other grains or materials.

Dockage is a term that is not well understood within the United States or abroad. It is frequently confused with other terms used in describing wheat quality, such as damaged kernels, foreign material, shrunken and broken kernels, and total defects. The term is somewhat unique to U.S. wheat in the sense that the Canadians, for example, remove all such material from the wheat that they export. As another example, dockage, as defined and measured by one type of equipment (the Carter Dockage Tester) within the United States, is quite different from that which is defined and measured as dockage—or besatz—by another type of equipment in Europe. A report comparing the two methods stated that what was considered dockage under the U.S. method was a small component of what was considered dockage under the European method and that this fact alone could account for some very angry complaints from

buyers who believed that the United States and European measurements gave equivalent results.[3]

The U.S. practice of measuring dockage, and then rounding this measurement down to the next lower half-percentage point and reporting the lower amount on the shipment certificate, can result in an understatement of dockage by up to 0.49 of a percentage point. Such a method of rounding and reporting works to the advantage of the wheat seller who receives wheat prices not only for the wheat he or she is selling, but also for up to 0.49 of a percentage point of the less valuable dockage that may be contained in that wheat. Thus, the seller has an incentive to load wheat with dockage at the higher end of any given half-percent rounding increment so that the maximum gain from the rounding rule can be attained. Just the opposite, however, is true for the wheat buyer who, under the above scenario, would end up paying wheat prices not only for the wheat he or she receives, but also for the quantity of dockage that was rounded down to the next lower half-percentage point. Some buyers of U.S. wheat consider the above practice a form of deception. Others believe that the practice does not enhance U.S. wheat exports and that the current rounding procedure needs tightening.

Data Bases Used in Analyzing Wheat Dockage Measurements

Our objectives regarding wheat dockage were to determine (1) the amount of dockage in wheat at various points in the marketing stream and (2) the extent to which market participants were benefiting from the current dockage rounding rule. As discussed in appendix I, dockage is only one of a number of issues related to grain standards that may be sparking complaints from overseas buyers and otherwise causing problems in terms of the United States' ability to compete favorably in world grain markets. As agreed with Congressman Dorgan, this part of our work was limited to the wheat dockage issue.

To help us meet our objectives, we obtained three FGIS computerized data bases representing (1) 60,756 wheat dockage measurements taken during the first 3 weeks of the 1984 harvest, (2) 12,532 supervisory dockage measurements taken with respect to interior truck, rail, and barge wheat shipments during the 30-month period ending May 1985, and (3) 2,711 dockage measurements representing all export wheat shipments (by vessel) during 1984. These data bases are referred to

[3]A Comparison of the ICC Besatz Test and U.S. Grain Grading Factors, Kansas Agricultural Experiment Station, Contribution No. 85-366-D, April 1985.

hereafter in this appendix as "harvest," "interior," and "export." We did not verify the accuracy of these data bases.

Harvest Data Base

FGIS established the harvest data base by obtaining actual dockage measurements from inspections of wheat at selected locations during the first 3 weeks of the 1984 harvest. This data base does not represent the universe of all wheat harvested and shipped during the period because, at this level in the marketing system, not all shipments are inspected. Wheat harvesting generally begins in Texas in May, proceeds north through the mid-United States, and ends in September at the Canadian border. The harvest data base, broken down by the number of shipments for each of the five major wheat classes, is shown in table III.1. The table also shows the quantity of each class of wheat produced during the 1984 production year and the general production area.

Table III.1: Harvest Data Base Broken Down by Wheat Class

Wheat class	Number of shipments/ inspections	1984 production (millions of bushels)	General production area
Hard red spring (HRS)	8,793	409	North and South Dakota, Minnesota, and parts of Montana
Durum (D)	2,025	103	Same as for HRS and California
White (W)	12,765	300	Michigan and points east; also the Pacific Coast area
Hard red winter (HRW)	29,342	1,251	Eastern slopes of Rocky Mountains from Montana to New Mexico
Soft red winter (SRW)	7,831	532	Eastern parts of Texas and Oklahoma, Kansas through Illinois and Michigan, and east to the Atlantic Coast
Total	60,756	2,595	

Interior Data Base

The interior data base used in our analysis was obtained from FGIS' Grain Inspection Monitoring System—a computerized system designed to help FGIS supervise and monitor the accuracy of its inspection activities (whether performed by its own employees or by employees that it licenses who work for state or private organizations). Under this system, FGIS performs a supervisory inspection of grain samples and compares the results thus obtained with the results of the original inspections. The results of the supervisory inspections are entered into the Grain Inspection Monitoring System (as were the results of the original inspections). We, however, limited our analysis to only those supervisory inspections involving the shipments of wheat at interior

locations. Table III.2 shows the interior data base used in our analysis, broken down by transportation mode.

Table III.2: Interior Data Base Broken Down by Transportation Mode

Transportation mode	Number of reinspections
Truck	3,601
Rail	8,272
Barge	659
Total	**12,532**

The Grain Inspection Monitoring System does not distinguish its supervisory inspections by wheat class or volume shipped and, therefore, we were unable to perform certain analyses with the data in the interior data base that we were able to perform with data in the harvest and export data bases.

Export Data Base

The export data base included dockage measurements with respect to all 1984 export wheat shipments by vessels. It did not include dockage measurements for 1984 export shipments by truck and rail to Canada and Mexico. The record pertaining to each vessel shipment included information about the class of wheat loaded, the numerical grade of the wheat determined by FGIS or licensed state inspectors (e.g., U.S. No. 2), the percentage of each quality factor used in the grade determination, the export elevator from which the shipment was made, and the weight and destination, if known, of each shipment. The data base included dockage measurements pertaining to 2,711 shipments, as shown in table III.3.

Table III.3: Export Data Base Broken Down by Wheat Class

Wheat class	Number of shipments
HRS	765
D	250
W	434
HRW	909
SRW	340
Mixed[a]	13
Total	**2,711**

[a]Mixed wheat is any mixture of wheat that consists of less than 90 percent of one class and more than 10 percent of another class.

The methodology we used in analyzing the three data bases is explained in the sections that follow. Basically, it involved (1) a series of computer runs allowing us to determine the amounts of dockage in samples of wheat at harvest and the interior and in the universe of wheat at export and (2) an analysis of the extent to which market participants were benefiting from the current dockage rounding rule.

Amounts of Dockage in Wheat at Different Points in Marketing Stream

Our analysis of dockage measurements from the three data bases we used did not support wheat producers' contention that wheat is relatively clean at the time it is harvested and that dockage (dust and other material) is added to it as it moves through the marketing stream. Table III.4 reflects the results of our analysis for each data base.

Table III.4: Percentage Distribution of Dockage Using Harvest, Interior, and Export Dockage Measurements

Dockage range[a]	Harvest (60,756 measurements)	Interior (12,532 measurements)	Export (2,711 measurements)
0.00 - 0.49	31.18	14.30	14.06
0.50 - 0.99	41.44	55.03	71.17
1.00 - 1.49	14.28	18.70	13.99
Subtotal	**86.90**	**88.03**	**99.22**
1.50 - 1.99	5.18	5.99	0.74
2.00 - 2.49	2.53	2.51	0.00
2.50 - 2.99	1.45	1.36	0.04
3.00 - 3.49	0.96	0.79	•
3.50 - 3.99	0.71	0.43	•
4.00 - 4.49	0.57	0.20	•
4.50 - 4.99	0.37	0.16	•
5.00 - 5.49	0.31	0.13	•
5.50 - 5.99	0.19	0.13	•
6.00 - 6.49	0.13	0.09	•
6.50 - 6.99	0.12	0.07	•
7.00 - 7.49	0.11	0.06	•
7.50 - 7.99	0.09	0.00	•
8.00 - 8.49	0.06	0.02	•
8.50 - 8.99	0.06	0.01	•
9.00 - 9.49	0.02	0.02	•
9.50 - 9.99	0.04	•	•
Over 10.00	0.20	•	•
Total	**100.00**	**100.00**	**100.00**

[a]Expressed as a percent of the wheat shipment that was inspected.

The dockage measurements shown in table III.4 are interesting. Statistically valid comparisons cannot be made of the measurements between each of the data bases due to the fact that (1) the wheat being observed at each marketing point is different and (2) the harvest and interior data bases represent nonstatistical samples of dockage measurements only, and not the entire universe as does the export data base. However, it can readily be seen that the amounts of dockage at harvest and the interior fell within much broader dockage ranges (0 to over 10 and 0 to 9.49, respectively) than did the amount of dockage at export (0 to 2.99). Except for the first dockage range—that is, from 0 to 0.49—wherein 31 percent of the wheat at harvest was found as compared to 14 percent at both the interior and export, a higher proportion of wheat at export was found in the lower dockage ranges than was the case either at harvest or in the interior.

How the numbers within the table are interpreted can be a matter of perspective. They can be used to suggest that some clean wheat at harvest is downgraded through the practice of blending as it moves through the marketing stream. On the other hand, the numbers also suggest that a substantial amount of wheat with relatively high levels of dockage is upgraded as a result of blending or cleaning as it moves toward export.

Dr. Mack Leath of USDA's Economic Research Service and the University of Illinois has done analysis similar to our own and, in fact, used the same dockage measurement data bases that we did. His December 1985 report entitled Economic Implications of Alternative Methods of Certificating Dockage in U.S. Wheat: An Executive Summary, shows the mean actual dockage in shipments at the time of harvest and at export, by wheat class, to have been as follows:

Table III.5: Mean Actual Dockage in Wheat at the Time of Harvest and Export[a]

	Mean dockage content	
Wheat class	Harvest	Export
HRS	0.98	0.88
D	1.07	1.09
W	0.99	0.64
HRW	0.96	0.65
SRW	0.92	0.68
All classes	0.97	0.71

[a]Comparable data from the interior data base do not exist. As stated on p. 24, the interior data base did not distinguish its dockage measurements according to wheat class.

As can be seen in table III.5, the overall mean dockage content of all dockage measurements at harvest was 0.97 percent; the average for individual wheat classes ranged from a low of 0.92 percent for soft red winter wheat to a high of 1.07 percent for durum. Except for durum, the measurements at export were lower than those at harvest. The overall mean content of all dockage measurements at export was 0.71 percent; the average for individual wheat classes ranged from 0.64 percent for white wheat to 1.09 for durum. Dr. Leath concluded from his analysis that dockage is either cleaned from wheat before it is exported or that only cleaner wheat is moving into export channels.

Extent to Which Market Participants Benefit From the Dockage Rounding Rule

Our analysis to determine the extent to which market participants were benefiting from the current rounding rule showed that dockage measurements in each of the three data bases appeared to be distributed randomly. This means that, from an overall standpoint, wheat sellers were not realizing the maximum allowable benefit allowed under the existing rounding rule. Such randomness did not always occur, however, within the various wheat classes and with respect to certain export elevators, as discussed later.

To determine to what extent market participants were benefiting from the current dockage rounding rule that disregards up to 0.49 of a percentage point of dockage present in each sample inspected, we were most interested in the location of each dockage measurement within each one-half percent increment. If market participants were taking advantage of the rounding rule, we would expect to find a larger number of the measurements at the upper end of each one-half percent increment, rather than at the lower end. For example, we would expect to find the bulk of the measurements in the range from 0.30 to 0.49 (or 0.80 to 0.99, or 1.30 to 1.49, and so on) rather than in the range from 0 to 0.20 (or 0.50 to 0.70, or 1 to 1.20, and so on). If, on the other hand, there was no attempt to realize the full benefits of the rounding rule—in which case the dockage measurements would be expected to occur randomly—we would expect close to 20 percent of the measurements to fall within each of the five intervals within each one-half percent increment. That is to say, for all measurements in a data base falling within the 0 to 0.49 percent increment, 20 percent would be expected to fall in each 0.10 interval, and so forth. The same would hold true for the intervals within all other one-half percent increments such as from 1.50 to 1.99 or from 3 to 3.49.

To facilitate our analysis, we converted all actual dockage values into what we refer to as absolute values in a single one-half percent increment of 0 to 0.49 percent. (The real value of each dockage measurement was not important to us here. Rather, what was important was the location of each measurement within the one-half percent increment in which the measurement fell.) We did this by dropping all whole numbers to the left of each dockage measurement decimal point, and, if the remaining value was 0.50 or over, we subtracted 0.50 from it. To illustrate, an actual dockage measurement of 0.18 would remain as such, an actual measurement of 0.68 would be converted to 0.18, 1.18 would be converted to 0.18, and so on. The results of the analysis follow.

The amount of dockage as reflected by each of the three data bases appeared to us to occur randomly. This is shown in table III.6 where it can be seen that approximately 20 percent of the shipments in each data base fell within each absolute value interval.

Table III.6: Absolute Values of Dockage in Harvest, Interior, and Export Data Bases

	Percent of shipments		
Absolute value intervals	**Harvest**	**Interior**	**Export**
0.00 - 0.09	18.03	21.72	16.27
0.10 - 0.19	19.39	21.83	23.61
0.20 - 0.29	19.95	19.15	19.24
0.30 - 0.39	21.24	18.32	19.79
0.40 - 0.49	21.39	18.98	21.09
Total	**100.00**	**100.00**	**100.00**

Taking our analysis a step further, we examined dockage measurements in terms of wheat classes and export elevators. Some variances were found when we looked more closely at the measurements as related to specific wheat classes and elevators.

Analysis of Dockage Measurements by Wheat Class

Table III.7 shows the results of our analysis of dockage measurements from the harvest and export data bases according to wheat class. This analysis was not done relative to the interior data base because, as explained earlier, the interior data base did not accumulate data according to wheat class.

Table III.7: Dockage Patterns at Harvest and Export by Class of Wheat

	Harvest				
	Percent of shipments by wheat class				
Absolute value intervals	HRS	D	W	HRW	SRW
0.00 - 0.09	17.64	18.91	17.50	18.48	17.41
0.10 - 0.19	20.82	20.10	18.72	19.23	19.29
0.20 - 0.29	20.54	18.17	20.36	19.51	20.72
0.30 - 0.39	20.96	20.45	21.59	21.15	21.52
0.40 - 0.49	20.04	22.37	21.83	21.63	21.06
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
	Export				
	Percent of shipments by wheat class				
Absolute value intervals	HRS	D	W	HRW	SRW
0.00 - 0.09	16.34	16.80	11.29	15.62	23.82
0.10 - 0.19	15.69	17.60	13.82	34.77	28.53
0.20 - 0.29	17.12	17.20	17.28	21.01	23.24
0.30 - 0.39	23.66	26.40	26.50	13.97	13.23
0.40 - 0.49	27.19	22.00	31.11	14.63	11.18
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

From table III.7 it can be seen that the dockage patterns at harvest were close to being random (i.e., 20 percent within each absolute value interval) for each of the five wheat classes. This is the same result we got when we earlier looked at the data bases overall. Dockage patterns at export, however, appeared to be less random when looking at individual wheat classes. For example, almost 58 percent of the white wheat shipments and 51 percent of the hard red spring shipments fell within the highest two absolute value intervals. At the other extreme, however, approximately 24 percent of the soft red winter shipments and 29 percent of the hard red winter shipments fell within that same range.

Analysis of Dockage Measurements by Export Elevator

We analyzed the amounts of dockage in wheat shipments made by 71 elevators in the export data base and then narrowed our analysis down to the 22 elevators responsible for 1 percent or more of the total wheat export shipments in 1984.[4] In total, these 22 elevators were responsible

[4]In the export data base, FGIS combined the activities of all elevators under the jurisdiction of its Washington field office because it was in the process of transferring inspection responsibilities from itself to the State of Washington. These elevators are counted as one here but were excluded from further analysis pertaining to individual elevators.

for almost 80 percent of these shipments. Consistent with the current dockage rounding rule, all 22 elevators were selling some dockage at wheat prices, as is shown in table III.8; however, the extent to which each was doing so varied.

Table III.8: Average Dockage Amounts in Wheat Shipments From Export Elevators Responsible for 1 Percent or More of the Total Shipments in 1984

Elevator	Weighted average dockage amount[a]	Percent of total shipments elevator was responsible for	Reintroduced dust as was discussed in appendix II[b]	Location
A	0.43	4.8	No	Gulf
B	0.35	1.2	Some	Great Lakes
C	0.35	2.2	Some	Great Lakes
D	0.34	9.4	No	West
E	0.32	1.5	No	Gulf
F	0.29	3.9	No	Great Lakes
G	0.28	5.6	Some	West
H	0.28	1.2	Some	Great Lakes
I	0.27	4.4	No	Great Lakes
J	0.27	3.1	No	Great Lakes
K	0.25	4.9	No	Gulf
L	0.25	3.9	No	West
M	0.23	3.0	No	Gulf
N	0.23	2.4	Some	Gulf
O	0.22	1.5	No	Great Lakes
P	0.22	1.1	No	Gulf
Q	0.21	3.0	No	West
R	0.20	3.5	Yes	Gulf
S	0.20	3.0	No	Gulf
T	0.18	3.5	No	Gulf
U	0.17	4.3	Yes	Gulf
V	0.13	7.9	Some	Gulf
Total	[c]	**79.8**		

[a]Dockage amounts were computed in the manner as described on pp. 27-28. A weighted average was then calculated for each elevator by multiplying the dockage amounts of the elevator by the volume of the related shipments, summing the results, and then dividing the total thus obtained by the total volume of the shipments from the elevator.

[b]Relates to FGIS dust survey reported in 1985.

[c]The average dockage amount for the 22 elevators was 0.26 percent. This average was obtained by summing the column and dividing the result by the 22 elevators (5.67 divided by 22 = 0.258).

Table III.8 shows a fairly wide range in the average dockage amount of each of the 22 elevators. Elevator A was at the high end of the range

with an average dockage amount of 0.43 of a percentage point. This means that elevator A, on average, sold a higher percentage of dockage at wheat prices in each of its shipments than did the other elevators. Elevator V was at the other end of the range with an average dockage amount of 0.13 of a percentage point. There are many different reasons why wheat shipments might contain dockage, as we have alluded to earlier. However, if the occurrence of dockage was random, the average dockage amount at such an elevator would be expected to be close to 0.25.

The 22 elevators were owned by privately and publicly held companies, including farmer-owned cooperatives. In some cases, the same company or cooperative owned more than 1 of the 22 elevators.

Comments From Officials of Two Grain Entities Owning Elevators in Table III.8

We discussed the results of our analysis, shown in table III.8, with officials from two grain entities that owned 1 or more of the 22 elevators in the table. During these discussions care was taken to avoid disclosing the identities of other grain companies and cooperatives that were a part of the analysis. We identified for the officials that we met with only those elevators that they respectively owned and operated. The purpose of our discussions was to obtain from the officials their policies with respect to blending grain.

Officials with whom we met at one of the two entities were pleased to learn that the average dockage amounts of two of their elevators were toward the upper end of the dockage range shown in the table. They told us that they have to pay wheat prices for any dockage in the wheat that they purchase, and they were pleased to see that they may be getting back this cost and perhaps even some more when they sell it. They see a company's or cooperative's ability to blend wheat to the upper reaches of the dockage tolerance as a virtue, and they credited their ability to be able to do so to the large storage capacities that they have at some locations. This allows them to store the wheat they purchase both in terms of its numeric grade and its actual dockage amount and to be able to blend this wheat to their advantage at the time they sell it.

Officials at this entity suggested that the elevators at the lower end of the dockage scale in table III.8 were either being run inefficiently or were elevators with only limited storage capacity.

The second grain entity we visited also owned more than one of the elevators shown in table III.8, and it was interesting to us that the average

dockage amounts of these particular elevators varied from the upper to the lower ends of the dockage scale. Officials at this entity stated that their policy was and is to operate fully in accordance with the Official United States Standards for Grain as well as all FGIS rules and regulations. Where blending is allowed by the standards and related rules and regulations, as it is for dockage, they encourage their elevator operators to do so. They said that there is economic incentive to blend wheat with varied amounts of dockage for which they paid varied prices. Blending such wheat can give them a competitive advantage in the marketplace because the economic gain achieved through blending can be used to help lower the price of the wheat that they offer for sale.

Officials of this entity said that the differences in average dockage amounts at each of their elevators reflected, perhaps, differences in each elevator's ability to blend wheat and also in the amount of dockage that was in the wheat each elevator was receiving. The officials told us that certain competitors have an advantage in this regard because the shipping bins they have at their elevators allow them to blend closer to the upper limits as related to dockage and other grade-determining quality factors. Elevators with shipping bins can load grain into the bins, hold it there until they receive the results of the quality inspections, and then release the grain into the vessel if it is the quality of grain desired. If it is not, the bins allow the elevator operator to return the unwanted grain to storage and then to start all over. Elevators without shipping bins do not learn of the quality inspection results until the grain is in the vessel. Because the costs of removing such grain from a vessel are great, elevators without shipping bins must be more cautious and, for fear that they might go over the dockage and grade determining quality factor limits, would generally not try to load grain too close to them.

Officials of this entity told us that, of their elevators included in our analysis, the one with the highest average dockage amount was the only one that has shipping bins.

Additional Analysis of the Dockage Being Shipped From Export Elevators

Because Congressman Dorgan was particularly interested in the amount of dockage in wheat export shipments, we analyzed the export data base in several additional ways. First, for each of the 22 export elevators, we determined the percent of shipments that fell within each dockage absolute value interval that was introduced and discussed earlier. The results of this analysis are shown in table III.9.

Table III.9: Absolute Values of Dockage in Export Shipments (Percent of Shipment)

Dockage absolute value intervals	Elevators										
	A	B	C	D	E	F	G	H	I	J	K
0.00 - 0.09	0.0	0.0	0.0	12.9	5.0	9.3	2.6	34.4	16.1	10.8	16.5
0.10 - 0.19	1.5	3.0	6.8	7.5	2.5	10.3	21.1	9.4	19.5	24.1	17.3
0.20 - 0.29	6.9	12.1	20.3	9.0	20.0	21.5	29.0	18.7	19.5	21.7	21.8
0.30 - 0.39	20.6	39.4	49.2	27.1	62.5	34.6	30.9	15.6	26.3	26.5	17.3
0.40 - 0.49	71.0	45.5	23.7	43.5	10.0	24.3	16.4	21.9	18.6	16.9	27.1
	L	M	N	O	P	Q	R	S	T	U	V
0.00 - 0.09	20.0	30.0	9.4	19.5	6.4	17.1	25.9	23.2	16.8	19.7	26.0
0.10 - 0.19	19.1	16.3	28.1	22.0	51.6	35.4	21.3	29.3	41.1	41.9	61.4
0.20 - 0.29	23.8	16.2	25.0	24.4	19.4	23.2	17.6	18.3	26.3	34.2	10.7
0.30 - 0.39	18.1	17.5	18.8	9.7	19.4	8.5	13.0	13.4	9.5	3.4	1.4
0.40 - 0.49	19.0	20.0	18.7	24.4	3.2	15.8	22.2	15.8	6.3	0.8	0.5

Using an arbitrary expectation that 50 percent or more of an elevator's shipments would fall within the top two absolute value intervals if an elevator was attempting to gain from the current dockage rounding rule and sell as much dockage as possible at wheat prices, it can be seen from table III.9 that elevators A through F were doing so. Almost 92 percent of elevator A's shipments were found to lie in the 0.30 to 0.39 and 0.40 to 0.49 intervals, and the percents of shipments in the same intervals for elevators B, C, D, E, and F were about 85, 73, 71, 73, and 59, respectively. Overall, however, the dockage amounts appear to balance out. Six of the 22 elevators (elevators P, Q, S, T, U, and V), for example, had 50 percent or more of their shipments falling within the two intervals at the other end of the scale (i.e., 0 to 0.09 and 0.10 to 0.19).

We also analyzed the export data base to determine whether all classes of wheat shipped by a given elevator had similar or different dockage patterns. We found that 16 of the 22 elevators included in our analysis shipped more than one class of wheat and that individual elevator dockage patterns, for unknown reasons, were often different for each wheat class. For example, 10 elevators met, for some but not all the classes of wheat that they shipped, our arbitrary expectation that 50 percent or more of their shipments would fall within the 0.30 to 0.39 and 0.40 to 0.49 intervals of the absolute range if they were attempting to gain from the rounding rule. The fact that they met the expectation for at least one class of wheat that they were handling appears to show that they are capable of blending wheat to gain from the rounding rule. Why they were not blending to gain from all the classes of wheat that

they handled was not determined, although FGIS, in commenting on this report, stated that (1) it had found that the average dockage content in each wheat class varies and (2) elevators may not have blended to the upper intervals in some cases because they did not have enough dockage material to blend.

We also compared the dockage patterns, by class of wheat, of different elevators owned by the same grain company or cooperative and found that, for whatever reason, these patterns also varied.

Proposals to Change the Dockage Rounding Rule

The current procedure used in determining the dockage to be reported on the official grade certificate raises questions related to fairness and accuracy. As a result, proposals to revise the procedure have been made from time to time.

The current procedure, adopted in 1964, does not require that the dockage content of a shipment be reported on the official grade certificate when the amount is 0.49 of a percentage point or less. When the dockage content is above 0.50 of a percentage point, it is rounded down to the next lower half percent, whole percent, or whole and half percent, as the case may be. Under this procedure, certificated dockage is almost always less than the actual dockage content, and each shipment can contain up to 0.49 of a percentage point of undisclosed dockage.

In our November 30, 1979, report on Federal Export Grain Inspection and Weighing Programs: Improvements Can Make Them More Effective and Less Costly (CED-80-15), we recommended to the Secretary of Agriculture that the grain standards be revised to require that dockage measurements be certified to the nearest one-tenth of a percent. We had concluded that, among other things, more accurate inspection certificates in terms of dockage would help restore foreign buyer confidence in the U.S. grain inspection system. In response to this recommendation, FGIS stated that it planned to revise the standard regarding the recording of dockage by May 1981. In October 1980, however, FGIS reported that the comments it had received in response to a preliminary proposal to report dockage results to the nearest one-tenth of a percent were generally unfavorable; the rule change, therefore, was not formally proposed. According to FGIS' Deputy Administrator, producer groups were among those opposing the change.

In January 1984, FGIS proposed a change in the dockage rounding procedure so that the actual dockage content would have been rounded to the

nearest 0.50 of a percentage point rather than down to the next 0.50 of a percentage point. This proposal followed an FGIS study showing that such a change would (1) reduce prices to producers by less than a tenth of a cent per bushel—the reduction would be even less if grain buyers were to pay more for wheat that had less dockage and (2) result in more accurate certification that would tend to increase the demand and price for U.S. wheat in export markets.

The January 1984 proposal, however, met the same fate as the earlier one. It was not implemented due to the preponderance of public comments FGIS received objecting to the change. Many of these comments came from farmers and producer groups who, in spite of the above study, were fearful of the cost to them of any such change. As a result, FGIS withdrew the proposal pending even further study.

FGIS views the Official United States Standards for Grain as "standards of consensus." As evidenced by the preceding discussion, FGIS has typically been reluctant to change the standards unless it believed the majority of the industry supported the change.

On October 8, 1985, the FGIS Advisory Committee met and recommended that FGIS propose, through its rule-making process, that dockage be certificated to the nearest tenth of a percentage point. As a part of the deliberations leading up to the recommendation, a subcommittee of the advisory committee reported on pending legislation to improve the quality of U.S. grain. The report stated:

"This testimony and the pending legislation, amplified by recent publications criticizing our grading standards and industry practices has really gotten the attention of both industry and F.G.I.S. We see a much stronger desire in industry and F.G.I.S. to seriously address the quality issues. We therefore recommend that we do all in our power to shift the debate on these issues back to industry and F.G.I.S. and off the floors of Congress. These issues are too technical, too complex and too emotional to tackle objectively in Congress. We cannot guarantee the end product but we think whatever we can come up with will be more workable and effective than laws drafted by the laymen that tend to ignore the inputs of industry they seek to protect."

One member of the committee, an official of a grain company that exports wheat and the one who seconded the motion to change the dockage rounding rule, said that such action would send a message to Congress that the industry was "hearing them."

Dr. Mack Leath, in his December 1985 report mentioned earlier, contrasted the current procedure used in certificating dockage (i.e., rounding down to the next 0.50 of a percentage point) with two alternative procedures involving (1) rounding to the nearest 0.50 of a percentage point, as was proposed by FGIS in January 1984, or (2) rounding to the nearest 0.10 of a percentage point, as we recommended and as is currently being considered. Dr. Leath concluded that the economic impact of adopting one of the two alternative procedures would be small, that benefits would come from rounding dockage to the nearest 0.50 percent as opposed to how it is now done, and that even greater benefits would be realized if dockage was certificated to the nearest 0.10 percent. These benefits are discussed in some detail in the next section of this appendix.

The results of this study were presented in a January 7, 1986, public meeting FGIS held to discuss wheat dockage certification. The majority of those expressing themselves at this meeting were concerned about the United States' declining grain exports and current grain quality problems—whether they be real or perceived. Most of the participants advocated a change in the way dockage is shown on the official grade certificate. FGIS planned to study the comments it received during the meeting and, if warranted, propose a specific rule change in a future issue of the Federal Register.

On January 30, 1986, FGIS' Advisory Committee again met and, among other things, discussed further its proposal to change the dockage rounding rule. Although sentiment for change seemed to be high, the committee decided that further action on the dockage issue would be held in abeyance pending the outcome expected in May 1986 of a series of related workshops being sponsored by the North American Export Grain Association.

Subsequent to the FGIS Advisory Committee meeting, the director of FGIS' Compliance Division told us that a change in the way dockage is certificated is likely to be made. We were told that if such a change does occur, FGIS will attempt to speed up what is a fairly time-consuming rulemaking process so that the change will affect the 1987 wheat crop.

Possible Outcomes of Change to the Dockage Rounding Rule

During our study we obtained the views of several different parties regarding the possible outcome of a change in the dockage rounding rule. An underlying theme of the comments received was that the amount of dockage in wheat will decline only if market participants are provided with economic incentives for reducing the dockage.

Officials of a grain company that operates country elevators told us that they did not believe a change in the dockage rounding rule would necessarily reduce the amount of dockage in the wheat that producers sell. They pointed out that producers who adjust their combine settings to reduce dockage would likely lose some wheat in the process and thereby have fewer bushels to sell. In addition, changing combine settings would slow down the harvesting process, thereby increasing the risks to producers of losses due to weather. For these reasons, the officials predicted that producers would not change their operations simply because of a change in the way dockage is certificated.

In contrast, an official of another grain company that also purchases wheat from producers told us that he believed that the amount of dockage in wheat would decrease. He based his opinion on his company's actual experience. He said that, for about the last 2 years, his company has deducted from the weight of wheat shipments any dockage in excess of 0.30 percent rather than the general trade practice of deducting only the amount of dockage in excess of 0.50. Since making the change, his company has found that producers have generally been delivering cleaner wheat.

ERS researcher Dr. Leath stated that changing the way in which dockage is certificated would not necessarily result in cleaner wheat. However, he concluded that such a change would alter various economic incentives for having higher amounts of dockage in wheat. For example, according to Dr. Leath, the incentive to blend wheat on the basis of dockage would be reduced. Where the "free allowance" or potential for undisclosed dockage under the current standards provides a strong economic incentive to blend dockage to targets just under the breakpoints for certification (0.49 percent, 0.99 percent, 1.49 percent, etc.), rounding to the nearest 0.50 of a percentage point would reduce that incentive and rounding to the nearest 0.10 of a percentage point would completely eliminate it. Dr. Leath identified the following as additional benefits that could be expected from a change in the dockage rounding rule. Tightening the rounding rule would:

- Remove the subsidy that is, in effect, frequently given now to producers who deliver wheat with a higher-than-average dockage content. If dockage were rounded to the nearest 0.10 percent, elevator operators would have a greater incentive to measure dockage and assess a cleaning charge on high dockage lots. Each producer would therefore be paid according to the quality of grain he or she has delivered. Under the current situation, producers who deliver clean wheat can end up subsidizing the price received by producers who deliver higher dockage content wheat.
- Improve pricing efficiency. Either of the two rounding rule changes that were being discussed would alter buyers' expectations of receiving near the maximum 0.49 percent undisclosed dockage—expectations that they build into the prices they are willing to pay for wheat. A dockage rounding rule change would result in price adjustments in the marketplace that would reward sellers of clean grain and penalize sellers of dirty grain.
- Alter elevator operators' decisionmaking with respect to cleaning. Either change would reduce the current incentive to leave dockage in wheat to "maintain its weight."
- Result in more accurate descriptions of wheat.
- Improve competitive position of U.S. wheat in world markets.
- Improve the ability of market participants to maintain wheat quality in terms of such things as fewer insects and less dust created in handling. Such improvements would be commensurate with the degree to which the dockage content in wheat delivered by farmers was reduced.

Capabilities of Carter Dockage Machines

Congressman Dorgan asked us to address whether or not the Carter dockage machines used by FGIS and other inspection agencies in measuring dockage were capable of measuring such dockage to a tenth of a percentage point. FGIS officials told us that the machines are capable of measuring dockage to a tenth of a percent and provided us a copy of a June 1985 study so stating.[5] The study stated, however, that the current FGIS testing procedure, as related to the machines themselves, is not capable of assuring a prescribed level of precision between all markets and testers used in official inspections. This is true when the levels of dockage in a wheat sample are particularly high, a condition under which very few lots of wheat are marketed. The study suggested that if dockage were to be certificated to 0.10 of a percentage point, a different testing procedure might be required.

[5]Performance Specification for Grading Equipment: Wheat Dockage Specification, USDA/FGIS, June 1985.

Status of Previous GAO Recommendations

In 1976 and 1979 we reported on USDA's official inspection system at U.S. export locations. Both reports identified weaknesses in the Official United States Standards for Grain that relate to Congressman Dorgan's concerns regarding wheat exports. The first report was entitled Assessment of the National Grain Inspection System (RED-76-71, Feb. 12, 1976) and was prepared pursuant to a joint request by the Chairman of the Subcommittee on Foreign Agricultural Policy, Senate Committee on Agriculture and Forestry, and the Chairman of the House Committee on Agriculture. The requesters asked us to review the grain marketing system because of disclosures of illegal inspection and weighing activities and their concern about the impact these irregularities would have, particularly on the export competitiveness of U.S. grain. We reported that, although we did not make a comprehensive analysis of the Official United States Standards for Grain, our inquiries showed that significant problems and questions warranted further analysis and attention by USDA. USDA had not been sufficiently concerned about the need for adequately directed and coordinated research on the grain standards by its agencies with research and marketing responsibilities. Research was needed to develop more sophisticated grain-testing equipment. Such research would also provide a sound basis for further refining and amending the standards to improve their usefulness to the entire grain-marketing chain, from the farm to the consumer. We recommended that USDA conduct intensified research and development to update the Official United States Standards for Grain; however, we did not make specific recommendations to change any of the standards. Therefore, we have concentrated our follow-up on the second report, which did make specific recommendations.

The second report entitled Federal Export Grain Inspection and Weighing Programs: Improvements Can Make Them More Effective and Less Costly (CED-80-15, Nov. 30, 1979) was prepared in accordance with a requirement of the Grain Standards Act of 1976. Our objectives were to evaluate the effectiveness of grain inspection and weighing at export elevators and the impact that changes required by the act and implemented by FGIS have had on foreign buyers' confidence in the U.S. grain marketing system. In that report we made specific recommendations to change certain standards and procedures. These recommendations, if implemented, would have resulted in inspection certificates that more accurately reflected the actual quality of the grain, provided foreign end-users with better information on certain quality factors, and assured greater uniformity in grain quality within a shipment.

In appendix III we discussed our 1979 report recommendation that dockage be rounded in the same manner as for the grading factors. The discussion that follows involves other recommendations in our 1979 report that we considered pertinent to the issue of wheat export shipment quality. These recommendations concern the need to improve shiploading procedures, eliminate tolerances for insects, study blending practices, and compute and report protein on a standardized moisture basis. For various reasons, FGIS did not implement these recommendations.

Shiploads Should Be More Uniform When Grain Is Received by Multiple Buyers

Because the physical properties of grain are such that, as it is handled, the lighter materials separate from the whole kernels, it is not possible to have a shipment of grain that is absolutely uniform in quality throughout. When a vessel is loaded, the lighter materials separate from the whole kernels and congregate in the center and on the top surface of the grain. This phenomenon is called segregation. The segregation problem is compounded if the quality of grain loaded on a vessel varies and if the shipment is divided among several buyers.

We made two recommendations that were designed to make grain shipments more uniform and, thus, lessen the chance that multiple buyers would be dissatisfied with that portion of the shipment that they received. Neither recommendation was adopted, and problems still exist.

Need to Prohibit the Loading of Off-Grade Grain

One recommendation we made was that FGIS revise its shiploading instructions to prohibit the loading of off-grade grain as part of a shipment when it is destined for multiple buyers. Off-grade grain is grain that is of a lower quality than what is shown on the grade certificate. It may be lower quality for many reasons—it may have more dockage, foreign material, shrunken and broken kernels, and/or total defects than is indicated on the certificate, or it may have less protein than is certified. We reported that the two shiploading plans in effect at the time of our review allowed large quantities of off-grade grain to be loaded as long as the quality of the average shipment met the standards for the declared grade. If the sublots on a vessel are not of uniform grade, it is possible that one buyer may receive grain of a quality poorer than what is shown on the certificate.[1]

[1]During our 1979 review, we reviewed 271 shipments and found that about 37 percent of those shipments were destined for multiple buyers. Of the 271 shipments, we found that 42 percent of them contained off-grade grain; some shipments had up to 24 percent lower quality grain than the grade specified.

When a shipment is destined for multiple buyers, the importer may exchange the official export certificate issued on the shiplot for two or more divided-lot certificates. The same quality information shown on the superseded certificate is shown on each divided-lot certificate, including a statement that the grain was officially inspected and/or weighed as an undivided lot. The importer then can use the divided-lot certificates for reselling the grain to smaller mills—mills not large enough to purchase an entire vessel load. If the divided-lot certificate is the basis for settlement, and the sublots are not of uniform quality, any buyer who received off-grade grain would end up paying for a better quality grain than what he or she received.

The lack of uniformity in grain quality throughout a shipment was a frequent complaint of the foreign buyers with whom we spoke during our 1979 review. The problem often arose when multiple buyers were involved in a purchase and one or more of them received grain only from that part of a shipment that was off-grade.

FGIS did not agree with our recommendation prohibiting the loading of off-grade grain as part of a shipment destined for multiple buyers. According to FGIS' response to the recommendation, any grain that was loaded aboard ship in accordance with the uniform shiploading plans was not considered to be off-grade. FGIS did state that it was developing a new statistical export-loading plan to replace the plans we reviewed, and, in fact, it published the new loading plan—referred to as the Cumulative Sum or Cu-Sum plan—in May 1980. The Cu-Sum plan was intended to assure buyers of a consistent minimum quality of grain throughout the lot. It established statistically based tolerances or limits on the amount of grain graded below the quality that the exporter declared the elevator would load—load order grade. It required that although the grade on portions of the lot may fluctuate above or below the load order grade, once loading is completed, the average quality of all factors in the lot must meet or exceed the quality of the load order grade.

In spite of the Cu-Sum plan's implementation, nonuniform cargoes may still be a problem when multiple buyers are involved. The vast majority of wheat shipments are divided-lot shipments, according to the Chairman of the Board of Directors of U.S. Wheat Associates. He stated at FGIS' public meeting on wheat dockage certification in January 1986 that (1) quality variations between sublots, allowed by the Cu-Sum shiploading plan and another plan used specifically for protein, create major problems for buyers when cargoes are split before reaching the

mill and (2) end-users do not receive the quality specified on the grade certificate.

During our review, other U.S. Wheat Associates officials told us that nonuniform cargoes were a key issue, particularly with regard to protein and dockage. They said that current FGIS shiploading procedures allow up to a one-half percent variance from the declared minimum protein. For example, if the export certificate states a minimum 14 percent protein, some sublots of the cargo can be 13.5 percent protein if an equal number are 14.5. Those who receive the 13.5 percent complain but those who receive 14.5 do not. Protein complaints, according to these officials, are more constant from year to year than other complaints that frequently vary according to crop quality and harvest conditions. U.S. Wheat Associates proposed, in September 1985, that the shiploading plan be changed to eliminate the statistical averaging used to determine whether a cargo meets contract specifications. Instead, U.S. Wheat Associates would require that all sublots composing the cargo meet the requirements for numerical grade factors and for any other nongrade factors such as protein, that the elevator declared it intended to load.

Some foreign buyer complaints, according to the FGIS Administrator in September 1985, can be traced to divided-lot certificate shipments that were divided among a number of buyers. FGIS officials gave two examples of these complaints at the January 7, 1986, public meeting to discuss wheat dockage certification. The first example concerned a wheat shipment that was sold to several buyers. The bulk grain was bagged during unloading. The buyer of the first 1,000 bags complained to FGIS that he had received 50 percent chaff. As part of its inquiry into the complaint, FGIS learned that the buyers of the remaining wheat were completely satisfied. (If the complainant received a disproportionately high amount of dockage, the other buyers would have received less.) The second complaint regarded a wheat shipment sold to one buyer who unloaded it at three locations. The complaint regarded the variation in dockage amounts at the three locations—location one had 0.50 percent dockage, location two had one percent, and location three had 1.35 percent. The export certificate showed 0.5 percent dockage—which means that dockage could be up to 0.99 percent. In its investigation, FGIS found that the actual average dockage in the vessel was 0.90 percent. Using the buyers' data, FGIS calculated the total received dockage to be 0.99 percent. While 70 percent of the shipment contained 1 percent or more dockage, the officials stated that the 0.5 percent that was shown on the certificate was correct.

FGIS has discovered that many foreign customers do not widely understand the concept of segregration of particles, during handling and shipment, which causes considerable dust and lightweight dockage to remain on the top of the cargo space. The effect of segregation, according to FGIS officials, is that when the vessel hatches are opened at destination, the grain has an extremely poor appearance. If the grain had been cleaned prior to loading, as some of our foreign competitors do, they said the apparent quantity of dockage material would be lower, and the perceived quality would be substantially higher.

FGIS is currently evaluating the effectiveness of the Cu-Sum shiploading plan. It has entered into a contract under which USDA's Agricultural Research Service, through the University of Southwestern Louisiana, will evaluate the (1) scope and performance of the plan and (2) effectiveness of the plan in ensuring that exported grain meets specified quality standards. The contract also calls for a study of various schemes to enhance the plan's effectiveness. The study should be completed by September 1986.

Need to Prohibit the Combining of Grain Samples From Multiple Loading Belts

The second recommendation we made to improve cargo uniformity directed FGIS to revise its instructions so as to prohibit combining grain samples from multiple loading belts to determine sublot quality unless the grain represented by the samples was mixed properly during loading. We reported that the practice of combining samples from two or more belts, when the grain was not comingled during shiploading, could result in a lack of uniformity in grain quality and increase the probability that buyers of partial shipments could receive lower quality grain than was officially certified. This practice provides the potential for off-grade grain to be loaded into individual shiploads without detection and accurate certification. This can occur because FGIS instructions permit the combining of samples from more than one belt if a licensed inspector or grader makes a visual check to ensure that the samples are uniform in quality. FGIS, however, considers the grain to be uniform even if a sample is one grade lower than the certified grade.

We visited 12 elevators during our 1979 review to study shiplot loading. At 9 of the 12 elevators, multiple shipping belts were used for loading export grain. The grain was often loaded in separate shipholds using separate grain streams that were never blended. This occurred 73 percent of the time at these nine elevators, yet grain quality was determined from combined samples. At the time of our 1979 and 1976 reviews, we had samples graded before they were combined and found

instances where the grain on one of the shipping belts was one grade lower than the certified quality.

We reported this condition in both our reports. USDA's Office of Audit also reported on the condition twice—in May 1973 and July 1978.

In response to our recommendation in 1979 to prohibit combining grain samples from multiple loading belts unless the grain is properly mixed during loading, FGIS conducted a feasibility study that concluded that no change should be made because "improvements in uniformity would cause complications for both the export industry and the inspection service" and not "provide substantial benefits to foreign receivers." FGIS further identified the following complications that influenced its decision not to implement our recommendation. FGIS decided not to pursue our recommendation because it would require physical changes to 27 out of 80 export elevators; cause affected elevators to wait longer to get inspection results (thereby slowing down loading); require additional inspectors, equipment, and laboratory space; and create down time and confusion in those laboratories. FGIS stated that records of past shiploadings offered no clue as to the degree of improvement that could be expected from adopting our recommendation and concluded that there would be only slight improvement from such a change. This practice is still allowed.

Grain Standards Should Not Have Tolerances for Insects

In our 1979 report, we stated that insect infestation had been one of the most prevalent of the foreign buyers' formal complaints. Further, the problem may have been of even greater magnitude because foreign buyers did not complain each time they received an insect-infested shipment. FGIS blamed much of the problem on hidden or latent infestation, but we concluded that FGIS' instructions on testing for insects and certifying the extent of infestation were also causes.

We recommended that all grain in which insects were found either be certified as infested or fumigated before shipment. Our recommendation was made in response to (1) FGIS instructions that considered the presence of a single weevil or other insect incidental (i.e., under the instructions, insects detected during sampling and grading are not disclosed on inspection certificates unless they exceed certain levels) and (2) USDA research showing that FGIS inspection methods could neither determine the hidden or latent infestations of internally developing insect species nor detect eggs or some larval stages of externally developing species that feed deep inside the germ portion of a grain kernel.

Actually, FGIS first presented the issue of a zero tolerance for live infestation in a November 1977 notice to the industry and, in April 1979, issued a congressionally mandated report entitled Adequacy of Existing Official U.S. Standards for Grain in which it stated its position on insects. The report said that insects, live or dead, are objectionable; that FGIS had been and was still working with research people to find a solution to the hidden insect problem; and that insect infestation in grain is a major issue. The report also said that insects are a source of foreign complaints about the quality of U.S. grain; that domestic food processors face the possibility that products made from grain containing insects can be seized, even though the grain was assigned a numerical grade under existing U.S. grain standards;[2] and that correction of these standards to better reflect insect infestation is a high priority.

Subsequently, a 1981 USDA research report entitled Insect Infestations in Wheat and Corn Exported From the United States concluded that wheat and corn exported from the United States contained a significant incidence of undetected or undeclared insect infestation. The extent and frequency of insects found in the grain suggested that insect tolerances permitted under current guidelines may be excessive and that inspection methods being used may not provide an accurate evaluation of insect contamination in U.S. grain. In an interim report, the researchers had stated that in initial inspections of about 900 wheat and corn samples taken from export shipments, 3 percent of the wheat samples and 5 percent of the corn samples were found to contain insects. Inspection of the 900 samples following an incubation period showed that 16 percent of the wheat samples and 20 percent of the corn samples had insects. (The final report stated that 17.9 percent of 2,058 wheat samples and 22.4 percent of 2,383 corn samples had insects following incubation.) The research disclosed that the presence of only one adult insect was rarely incidental—that when a sample contained a live weevil on first examination, additional weevils were usually found after the incubation period. The report stated that the infestation levels permitted by the FGIS tolerances, when combined with hidden infestation, could adversely affect the credibility of U.S. grain inspections and suggested that insect tolerances be reevaluated.

[2]The Food and Drug Adminstration (FDA) sets limits on the maximum number of insect fragments that may be in a specified sample of flour. The limits are referred to as Defect Action Levels and are the point at which FDA will take action to remove the flour from the market. FDA informs a U.S. attorney of the contaminated flour, and the U.S. attorney then directs a U.S. marshall to seize it.

FGIS held five public meetings to discuss the possibility of adopting a zero tolerance for live insects. According to the FGIS Deputy Administrator, in a speech given on March 5, 1984, discussion of such a possibility triggered significant controversy and generated complaints about the need for such a change and its potential for increasing marketing costs, reducing farm prices, and harming the environment from increased levels of chemical residue. Domestic processors and foreign buyers supported a zero tolerance because it responded to their complaints. The Deputy Administrator said in his speech that the proposal did not progress beyond the talking stage and that FGIS never formally proposed the issue for public discussion and, in actuality, eventually removed the issue from its regulatory review agenda. The Deputy Administrator summarized the insect issue as follows:

"In summary, FGIS is in the forefront as both a policymaker and arbitrator of insect activity in U.S. grain. While we are clearly not responsible for the levels of insect infestation that were established in 1924, some 60 years ago, as part of the Special Grade "weevily," we must recognize that our continued sanction of these tolerances through the issuance of a certificate indicating that the grain is 'free of insect and larval contamination' removes any economic incentive from the marketplace to control insect infestations."

Since that speech, some additional activity on the issue has occurred. On July 25, 1984, a subcommittee of the FGIS Advisory Committee issued a report on insect infestation. The three subcommittee members agreed that a problem existed, but they did not reach agreement on the problem's magnitude in the domestic milling industry or on a solution. Central to the issue was the question of whether changing the tolerance would reduce the presence of insects and whether the grain standards should describe wheat quality in the level of detail that end-users need.

On June 26, 1985, an FGIS Insect Infestation Task Force issued a report that described 33 insect-related problems and a number of potential recommendations to improve FGIS' detection, identification, and certification of insects in grain. Seven of the recommendations involved changing the Official United States Standards and related tolerances. Included was a recommendation that FGIS evaluate the impact of eliminating tolerances for insects. The other recommendations concerned FGIS procedures, FGIS internal management, and research.

On October 8, 1985, a second subcommittee of the FGIS Advisory Committee recommended that FGIS obtain public comments on the following:

- For all grains covered by the Official United States Standards, should the standards distinguish between the types of insects found?
- For wheat, should there be a separate grade factor for insect-damaged kernels?

The subcommittee also recommended that FGIS implement the task force's recommendations concerning procedures and internal management; consider various approaches for phasing in lower insect tolerances; and establish an interagency task force to discuss the infestation issue, especially in terms of the need for communication and consistency between various agencies. It also recommended that FGIS initiate an educational program with USDA's Cooperative Extension Service on insects and insect control. FGIS is planning to obtain public comments on the need to revise the Official United States Standards regarding insects after the process is completed for dockage.

Research Should Be Conducted on the Need for Restricting Certain Blending Practices

We recommended that FGIS conduct research concerning the possible need for restricting certain blending practices, such as adding low-quality grain screenings or different types of grain to good-quality grain, blending wheat with known sprout damage with wheat that does not contain such damage, or blending high-moisture corn with low-moisture corn. In its response to the recommendation, FGIS concurred that such research was needed. It stated that prohibiting the blending of grain dust or any non-grain related material, other than fumigants, would enhance the quality and appearance of U.S. grain and would reduce the safety risks encountered due to human exposure to poor air quality and "unfortunate disasters" attributed to grain dust. However, FGIS stated that practices that involve the blending of various qualities of the same kind of grain provide a market for occasional low-quality grain that is harvested. According to FGIS, discontinuing such blending practices could significantly increase marketing costs by decreasing marketing channels for low-quality grain.

In October 1980 FGIS stated that it still considered research on blending practices to be important; however, it had no such studies under way. In May 1981, after a change in administrations, FGIS completed its consideration of the recommendation. FGIS determined (1) that it had no reasonable interest in promoting blending studies because the industry's practice of blending has not caused any reported problems restricting grain marketing and (2) that blending helps provide markets for low-quality grain.

FGIS is now involved with some research related to our recommendation concerning the blending of high- and low-moisture corn. For FGIS, USDA's Agricultural Research Service has a project to develop procedures and instrumentation to measure corn moisture on a one-kernel-at-a-time basis. This technology, according to FGIS' Standardization Division Director, is a prerequisite to detecting high- and low-moisture corn that was blended together.

FGIS does not have research on the other blending practices that we identified. According to the Standardization Division Director, even if research showed that other practices should be prohibited, FGIS could not enforce a prohibition. He said there would be no way for FGIS to determine where the prohibited blending occurred. Blending can occur any place from the farm to export elevators, and FGIS does not have the resources to monitor the movement of all grain.

Nonetheless, the Food Security Act of 1985 (Public Law 99-198) directed the Office of Technology Assessment (OTA) to conduct a study of grain export quality standards and grain handling practices that will touch on our 1979 recommendation. OTA is required to evaluate the consequences of blending restrictions on export sales, merchandising costs, and producer prices. The restrictions would prohibit the

- recombination with grain that might possibly be exported of any dockage or foreign material once it has been removed;
- addition of dockage or foreign material to any grain that may possibly be exported, if doing so reduces the grain's grade, quality, or storability; and
- blending of similar grains that have moisture contents differing by more than 1 percent.

Protein Content Should Be Computed and Reported on a Standardized Moisture Basis

In 1979 we reported that some foreign buyers complained about receiving grain with protein contents lower than certified. We reported that the complaints were due, in part, to the difference between the U.S. and Canadian methods for computing and stating protein.

The percentage of wheat's protein content changes as the wheat's moisture changes. Therefore, to evaluate whether the wheat has sufficient protein for a buyer's needs, the buyer needs to know both the percent of protein and percent of moisture content at which the wheat was measured. Our foreign competitors report protein on a standardized moisture basis, i.e., they compute protein at whatever the wheat sample's

moisture content is ("as is" moisture) and then convert the protein content to what it would be if the wheat had a specified moisture level. Canada and Australia report protein on their export certificates at specified moisture levels. Canadian wheat protein is stated as if it had 13.5 percent moisture. Australian wheat protein is stated as if it had 11 percent moisture.

We recommended that FGIS revise its inspection procedures to require that wheat protein content be computed and reported on a standardized moisture basis rather than the "as is" basis. Under the "as is" basis, the lower the moisture level, the higher the stated percentage of protein would be. Therefore, an importer who uniformly tested and compared the protein content of U.S. and Canadian wheat shipments, both having 12 percent moisture and certified at the same level of protein content, would find that the Canadian wheat actually had a higher protein content.

In 1978 FGIS proposed to the U.S. grain industry that the United States change the method of computing protein content to the standardized moisture basis. The change was not implemented because of opposition from the U.S. grain industry and the FGIS Advisory Committee. In 1979 FGIS concurred with our recommendation to compute and report protein on a standardized moisture basis. However, it did not implement a standardized moisture basis, again because of opposition from the U.S. grain industry and FGIS Advisory Committee. In its October 1983 report FGIS completed its consideration of the recommendation by stating:

"Because of continued U.S. industry and Advisory Committee opposition, FGIS now believes that it should strive to educate foreign contractors regarding the importance of contracting for protein on a standard or constant moisture basis. This would leave the moisture basis open for contract negotiations between buyers and sellers rather than "forcing" them to use a specific moisture basis. This education will be on-going whenever FGIS meets with foreign contractors."

Nonetheless, protein reporting may still be a problem. The Chairman of the Board of Directors of U.S. Wheat Associates stated, January 7, 1986, at FGIS' public meeting on wheat dockage certification, that serious consideration should be given to reporting protein content based on a designated moisture level. He said

". . . Our two major competitors for the protein wheat markets, Canada and Australia, have found it extremely advantageous to report protein content on specified moisture levels, 13.5 and 11% respectfully. In the U.S. we measure protein based on an "as is" moisture. As you know, protein content decreases as moisture levels in wheat increase. When protein is reported on an "as is" moisture basis, there may be

significant differences between testing laboratories resulting not necessarily from differences in actual protein content but from differences in moisture results. This situation, coupled with the fact that grain moisture levels vary during shipment especially when transported from a cold climate to a tropical one, results in numerous complaints from our foreign buyers that they received "short protein." When protein premiums are high, as they currently are, a one-half percent difference in protein applied to a full cargo represents thousands of dollars. Since wheat is marketed with a broad range in moisture levels, normally between 8 and 14%, wheat which has 11% protein at 8% moisture would show only 9.57% protein at 13%. This situation creates confusion when determining protein levels."

The North Dakota State Wheat Commission proposed in March 1985 that protein be expressed on a specified moisture basis because the conversion from "as-is" to a specific moisture basis is simple and the change would help eliminate confusion and standardize language between the United States and its customers, who may view the competition's standardized protein as a plus in their purchasing decisions. The Chairman of the North Dakota State University Cereal Science and Food Technology Department also endorsed a change to a specified or constant moisture basis.

In commenting on this report, FGIS stated that possible changes in the method of computing protein content are being studied within FGIS and by industry groups.

U.S. GOVERNMENT PRINTING OFFICE 1986 - 622-231 - 1302/00293

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